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## 1 CLAIMS:

2

3 1. An apparatus for spraying liquid surface treatment  
4 material, said apparatus comprising:

5 a housing;

6 a liquid inlet for supply of the liquid surface  
7 treatment material;

8 a gas inlet for supply of pressurised gas to be  
9 mixed with the liquid surface treatment material;

10 an outlet nozzle through which the gas and liquid  
11 surface treatment material is sprayed;

12 a control valve adapted to regulate the supply of  
13 the liquid surface treatment material to the outlet  
14 nozzle;

15 a gas valve operable between an open position and  
16 a closed position;

17 a first communicating passageway connecting said  
18 gas inlet to said gas valve; and

19 a second communicating passageway connecting said  
20 gas valve to said outlet nozzle;

21 wherein said second passageway is provided with a  
22 stepped portion therein so that a gas vortex is created  
23 therethrough.

24

25 2. An apparatus according to Claim 1, wherein said  
26 second passageway is offset from said first passageway.

27

28 3. An apparatus according to either Claim 1 or Claim  
29 2, wherein said second passageway is substantially  
30 conical in shape.

31

32 4. An apparatus according to any preceding claim,  
33 wherein said second passageway includes an inlet and an  
34 outlet, wherein said second passageway is tapered from  
35 said inlet to said outlet.

36

1 5. An apparatus according to Claim 4, wherein said  
2 taper is between 1 to 15°.

3  
4 6. An apparatus according to either Claim 4 or Claim  
5, wherein said second passageway has a radius of  
curvature at said outlet so as to provide gas to the  
outlet nozzle in a substantially horizontal direction.

6  
7. An apparatus according to any preceding claim,  
8 wherein said stepped portion of said second passageway  
9 comprises a ledge whose width tapers up to a maximum of  
10% of the radius of said second passageway at the  
11 level of the stepped portion.

12  
13 8. An apparatus according to Claim 7, wherein the  
14 longitudinal axis of said outlet nozzle extends across  
15 said second passageway.

16  
17 9. An apparatus according to Claim 8, wherein the  
18 axis of symmetry of said ledge is offset from said  
19 longitudinal axis of said outlet nozzle.

20  
21 10. An apparatus for spraying liquid surface treatment  
22 material, said apparatus comprising:

23 a housing;

24 a liquid inlet for supply of the liquid surface  
25 treatment material;

26 a gas inlet for supply of pressurised gas to be  
27 mixed with the liquid surface treatment material;

28 an outlet nozzle through which the gas and liquid  
29 surface treatment material is sprayed;

30 a control valve adapted to regulate the supply of  
31 the liquid surface treatment material to the outlet  
32 nozzle;

33 a gas valve operable between an open position and  
34 a closed position;

1       wherein said piston valve comprises an inner apertured  
2       sleeve and an outer apertured sleeve, said inner and  
3       outer sleeves being co-axial, and wherein said inner  
4       sleeve is located within said outer sleeve and is  
5       rotatably adjustable relative to said outer sleeve.  
6

7       18. An apparatus according to any of Claims 12 to 17,  
8       wherein the liquid control needle valve is controlled  
9       by said trigger means via an axially-sliding sleeve or  
10      slipper member situated on a rearward portion of said  
11      housing.

12  
13      19. An apparatus according to any of Claims 12 to 18,  
14      wherein said liquid control needle valve is provided  
15      with a rotational flow adjustment means.  
16

17       20. An apparatus according to Claim 19, wherein said  
18       flow adjustment means comprises a stem member, a  
19       rotational adjuster, and a return spring, said stem  
20       member being threaded at its rearmost extremity to  
21       accept said rotational adjuster.  
22

23       21. An apparatus according to Claim 20, wherein said  
24       stem member is actuated externally by said trigger  
25       means, and is returned to its initial position by said  
26       return spring.  
27

28       22. An apparatus according to any of Claims 12 to 21,  
29       wherein said liquid inlet comprises a pressurized  
30       material supply connector, and wherein said needle  
31       valve is supplied with a liquid by said pressurized  
32       material supply connector.  
33

34       23. An apparatus according to any of Claims 12 to 21,  
35       wherein said liquid inlet comprises a gravity feed  
36       liquid reservoir, and wherein said needle valve is

1 portion of said passageway includes an inlet and an  
2 outlet and is tapered from said inlet to said outlet at  
3 an angle of taper of between 1 and 15°.

4

5 *Su* 28. A method according to any of Claims 25 to 27,  
6 wherein the mixing of said liquid and said annular gas  
7 *jet* is controlled by a trigger valve mechanism on said  
8 spray apparatus.

9

10 *Su* 29. A method according to Claim 28, wherein said  
11 trigger valve mechanism comprises:

12 a gas valve operable between an open position and  
13 a closed position;

14 a control valve adapted to regulate the supply of  
15 the liquid to be sprayed; and

16 a trigger means;

17 whereby said trigger means is adapted to operate  
18 both of said gas and control valves.

19

20 30. A method according to Claim 29, wherein said  
21 control valve is a liquid control needle valve.

22

23 31. A method according to Claim 30, wherein said gas  
24 valve is an axially-sliding piston valve.

25

26 32. A method according to Claim 31, wherein said  
27 piston valve comprises an inner apertured sleeve and an  
28 outer apertured sleeve, said inner and outer sleeves  
29 being co-axial, and wherein said inner sleeve is  
30 located within said outer sleeve and is rotatably  
31 adjustable relative to said outer sleeve.

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